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Date of Deposit

Michael A. Massing

Name of applicant, assignee or  
Registered Representative

Michael A. Massing

Signature

Date of Signature 10-7-2003

Our Case No. 10541-1074  
Visteon Case No. V201-0544

### IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:

Steven A. Thiel *et al*

Serial No. 10/055,792

Filing Date: January 18, 2002

For

Examiner: T. Kilkenny

Group Art Unit No.: 1733

**DECLARATION OF STEVEN THIEL, KELLEY MUNN, PAUL FISHER, HAROLD CUNNINGHAM, MARCO TOPPI, LARRY LAND, AND DAVID GALIYAS UNDER 37 C.F.R. 1.131**

Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

WE, Steven Thiel, Kelley Munn, Paul Fisher, Harold Cunningham, Marco Toppi, Larry Land, and David Galiyas (all the inventors), declare as follows:

1. We are the applicants of the above-identified patent application, and co-inventors of the subject matter described and claimed therein.

2. Prior to September 4, 2001, a working version of the invention as described and claimed in the subject application was made and reduced to practice in the U.S., as evidenced by the following:
- 

- a. Prior to September 4, 2001, having earlier conceived the idea of a method for assembling a fuel delivery system including thermoforming a first shell portion and a second shell portion of a fuel tank, wherein a reservoir assembly having a reservoir unit is also provided, and further wherein the reservoir assembly is fixed to one of the first and second shell portions, and wherein the first and second shell portions are sealingly connected to form a fuel tank to at least partially enclose the reservoir assembly within the fuel tank, and further where a fuel tank aperture is formed, at least one of us reduced the method to practice.
- b. Prior to September 4, 2001, having earlier conceived the idea of a fuel delivery system comprising a plurality of thermoformed shell portions for a fuel tank, at least one of said thermoformed shell portions having a fuel tank access aperture, and further, a non-integral reservoir assembly comprising a reservoir unit, said reservoir unit having its smallest cross-sectional area being greater than the area of said fuel tank access aperture, said reservoir assembly configured to store fuel and said reservoir assembly being attached to at least one of said thermoformed shell portions inside said fuel tank, at least one of us reduced the method to practice.
- c. The conception of the invention is evidenced by the copy of the invention disclosure document attached hereto as Exhibit A. All references to dates on Exhibit A are prior to September 4, 2001, and have been redacted.
- d. Prior to September 4, 2001, drawings were made of the invention contemporaneous with the reduction to practice of the invention, which are included in Exhibit B. These drawings were electronically attached to the invention disclosure of Exhibit A. The drawings correspond to cut-away

depictions of the reservoir assembly enclosed within the fuel tank, and were used to create the Figures of the present patent application.

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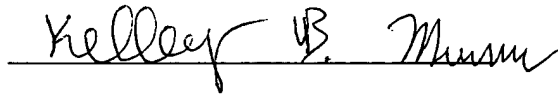
- e. The reduction to practice of the invention is further evidenced by the copies of purchase orders attached hereto as Exhibit C. The purchase orders are for the assembly cost of the fuel delivery models disclosed in the present patent application, which were assembled via the method disclosed in the present patent application. The Order Date of this purchase order is prior to September 4, 2001, and has been redacted.
3. All statements made herein of our own knowledge are true and that all statements made on information and belief are believed to be true, and further these statements are made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful statements may jeopardize the validity of the application or any patent issuing therefrom.

DATE: 10/1/03



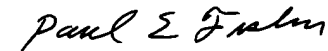
Steven A. Thiel

DATE: 10/3/03



Kelley B. Munn

DATE: 10-2-03



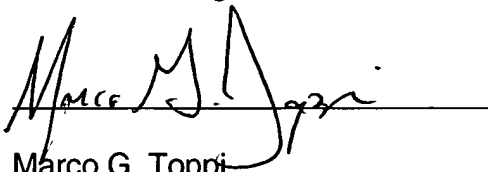
Paul E. Fisher

DATE: 10/1/03



Harold Cunningham

DATE: 10/2/03




Marco G. Toppi

DATE: 10/2/03



Larry D. Land

DATE: 10/3/2003



David Galiyas



Visteon

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## Online Invention Disclosure: View Invention Disclosure

**Inv. Discl. Docket No:** V201-0544

**Creation Date:** REDACTED

**Approval to submit was given by:** REDACTED

### Section 1: INVENTION DESCRIPTION

**Title of Invention:** FUEL DELIVERY MODULE FOR USE IN THERMOFORMED FUEL TANKS

**Patent Evaluation Committee:** \$VETS

**CPSC Code:** 10.01.01

**Originating Country Code:** US

**Related Disclosure(s):** 16427

### Section 2: PROBLEM & SOLUTION

**Description or Comments:** This technology allows for internalization of fuel system components that have in the past been mounted externally to the fuel tank. Internalization of components reduces the number of openings needed in the tank shell and therefore reduces hydrocarbon permeation to the outside of the fuel tank. Using this fuel delivery module design with thermoforming technology allows for a larger reservoir volume than a convention fuel delivery module. It also allows for removal of most components for service.

**Attachment:** See Section:9 ATTACHMENTS

### Section 3: PRIOR ART

**Description or Comments:** Fuel delivery modules in the past have been limited in size and shape by the diameter of the hole in the fuel tank that it is assembled through. Prior art is included in Disclosure number 16427 initiated by Dave Galiyas. The fuel delivery module described in the current

REDACTED

invention disclosure has more content than the previous design by Mr. Galiyas. For example, this prior art does not include an inline fuel filter in the design.

**Attachment:** See Section:9 ATTACHMENTS

Section 4: NEW TECHNOLOGY

**Description or Comments:**

**Attachment:** See Section:9 ATTACHMENTS

Section 5: DETAILED DESCRIPTION

**Description or Comments:** See attached MS-Word document.

**Attachment:** See Section:9 ATTACHMENTS

Section 6: DATES

**Record(s) of Completion:** REDACTED

**Date of Completion:**

**First Production Use:** REDACTED  
**[Model and Date]**

Section 7: CATEGORY QUESTIONS

**Invention Category:** Manufacturing

Category Questions do not exist or not answered.

Section 8: MISCELLANEOUS ITEMS

**Is it a Government Contract?:** No

**If yes, Government Contract Number:**

**Identify a government agreement, partnership, consortium, or other company involved with conception or first building of the invention:**

REDACTED

**Identify potential licensing opportunities within and, as appropriate, outside the auto industry. If possible, name potential companies that should be contacted:**

REDACTED

Section 9: ATTACHMENTS

File Name	Description
Click on File Name to view and print it.	
<a href="#">30121module_2.jpg</a>	Exploded view of fuel delivery module.
<a href="#">30121module_1.jpg</a>	View of fuel delivery module.
<a href="#">30121tank_asm4.jpg</a>	View of fuel delivery module in thermoformed tank.
<a href="#">30121tank_asm5.jpg</a>	View of fuel delivery module in thermoformed tank.
<a href="#">30121tank_asm6.jpg</a>	View of fuel delivery module in thermoformed tank.
<a href="#">30121tank_asm7.jpg</a>	View of fuel delivery module in thermoformed tank.
<a href="#">30121tank_asm8.jpg</a>	View of fuel delivery module in thermoformed tank.
<a href="#">30121Detail_Description.doc</a>	Detailed Description of fuel delivery module for thermoformed tanks.

Section 10: INVENTORSHIP

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## Visteon Fuel Delivery Module for use with Thermoformed Fluid Tanks

~~This fuel delivery module design when used in conjunction with a thermoformed fluid tank has~~ many characteristics that are superior to prior art fuel delivery modules. In the past fuel delivery modules have been assembled to fuel tank through an opening cut in the tank after the tank has been molded. The thermoformed tank fuel delivery module is not assembled through an opening cut in the tank but rather inserted into the tank as the tank is being formed.

The thermoform process calls for two sheets of tank material to be molded to the shape of one half of the tank each. Generally, the tank is divided by top and bottom. Once the two halves have been formed the fuel delivery module is welded to the interior of one half of the tank. This method allows for design features and components that have, up until now, been unfeasible given the size of the tank opening previously used to assemble fuel delivery modules into tanks.

The fuel delivery module is no longer limited to a cylinder of a certain diameter. It can now assume the shape that is most desirable for a particular design and component content. Component content includes but is not limited to a fuel pump, a fuel pressure regulator, a fuel reservoir, and an inline fuel filter. The last of these items has generally in the past been assembled externally to the fuel tank due to spatial constraints in the fuel delivery module. When the filter has previously been integrated with the fuel delivery module, its capacity has been severely limited.

The main component of the module is the reservoir assembly. The reservoir assembly is composed of a reservoir, an auxiliary pump, the primary fuel pump, a fuel pressure regulator assembly, a reservoir cover, a fuel level sensor and features that allow for assembly of the module in the fuel. An inline fuel filter can also be incorporated into the reservoir assembly. The assembly of the reservoir assembly to the internal surface of the tank provides for a fuel delivery module design that solves many problems of prior art fuel delivery modules.

The reservoir serves the purpose of maintaining a depth of fuel in the immediate vicinity of the fuel pump. In order to provide a fuel flow to the engine at a constant pressure, the fuel pump must remain submerged during driving maneuvers that would cause fuel slosh resulting in pump starvation causing a drop in system fuel pressure as well as during low-fuel engine starts. The reservoir has features to prevent any leak paths to the rest of the fuel tank. The usable volume of the reservoir is dependent on design specifications and is usually called out as a minimum volume. This invention allows for a reservoir volume much greater than previous fuel delivery modules.

The auxiliary pump utilizes a sock-type filter for fuel pickup that rests on the bottom surface of the fuel tank. The auxiliary pump maintains the maximum fuel volume in the reservoir. The sock filter position is critical in order to minimize the volume of unusable fluid in the tank. Positioning it as close to the bottom as possible is critical. Methods for accomplishing this are described below.

The primary fuel pump is situated such that the inlet is at the deepest point of the reservoir. This pump provides the fuel flow to the engine as well as the flow to the auxiliary pump for reservoir

fill. The pump is mounted with isolators to reduce noise and vibration transmission through the module. The pump is also mounted in such a way that it can be removed for service or to be replaced.

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The fuel pressure regulator assembly consists of a regulator retainer and pressure regulator. The regulator retainer is made of a conductive material so that the regulator is grounded to prevent electrostatic buildup. The retainer has a feature to allow for snap fit to the reservoir assembly and can contain an over pressure relief valve in parallel to the outlet port. The regulator assembly maintains a constant pressure throughout the fuel system.

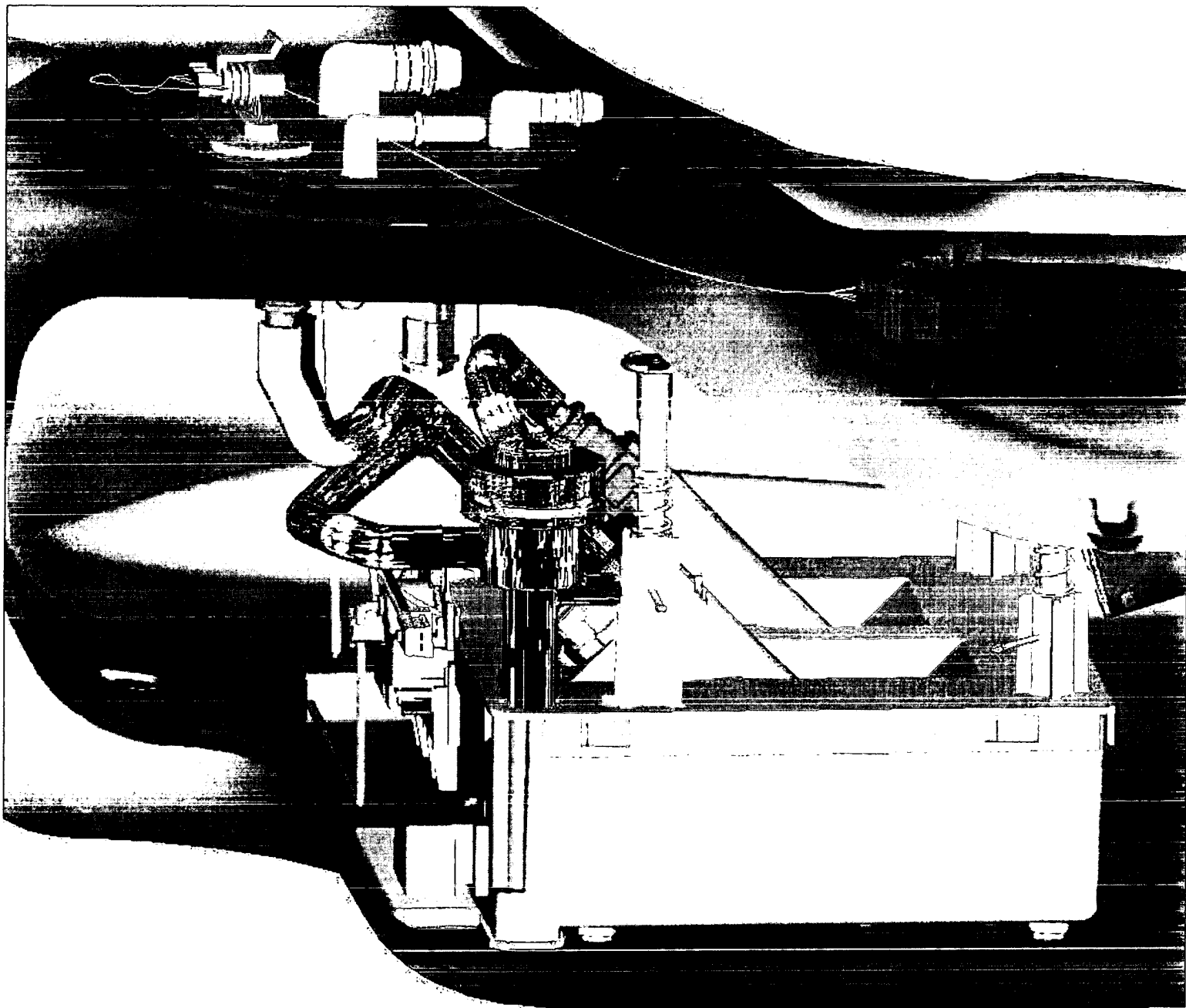
The reservoir cover includes features that mount the fuel pump and inline fuel filter. The cover serves two purposes. First, the cover will impede fuel from sloshing out of the reservoir during vehicle maneuvers. Second, the cover will position the fuel pump and inline filter for optimal performance and serviceability.

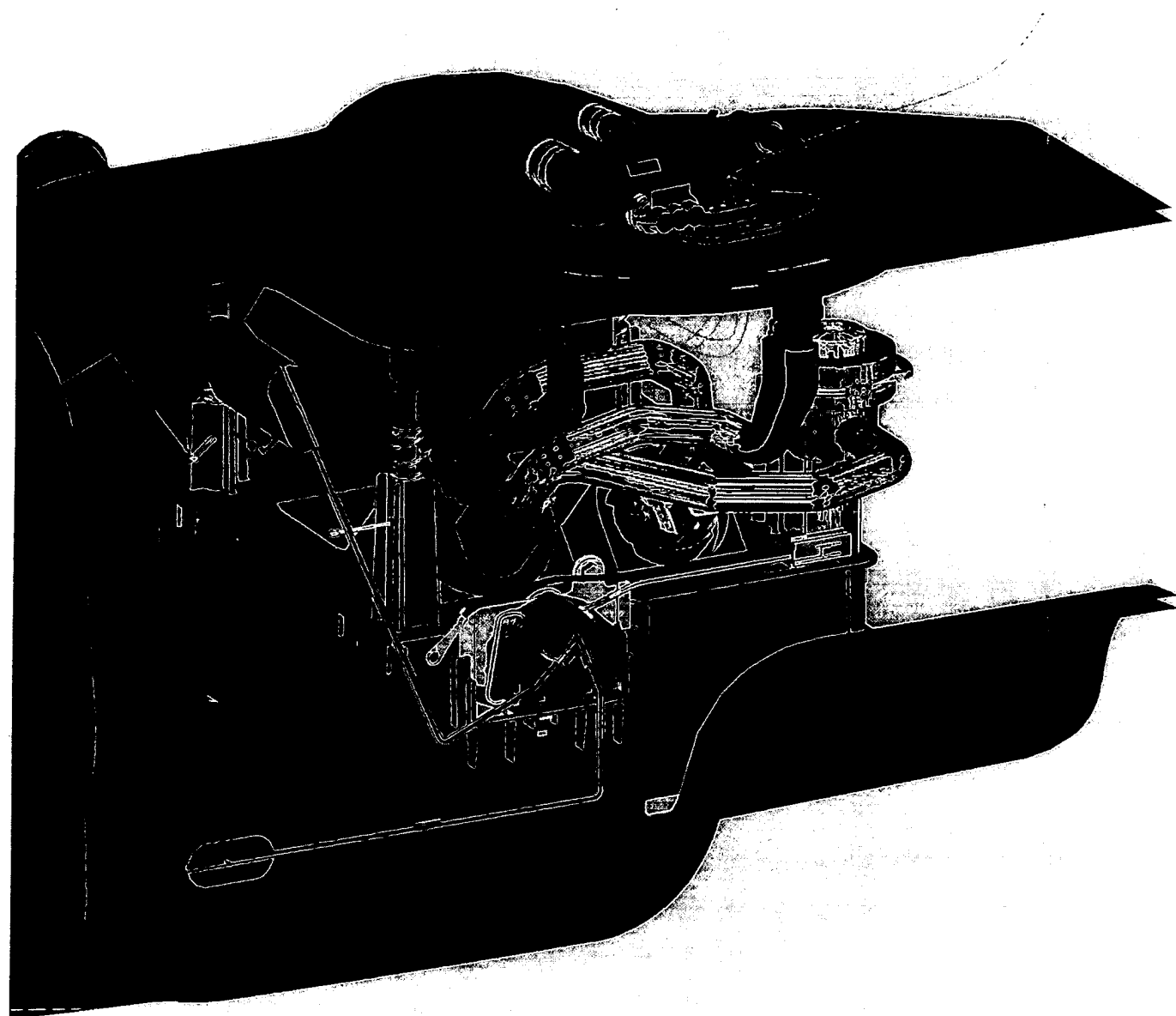
A fuel level sensor is mounted to the side of the reservoir. The fuel level sensor provides a signal to the engine control module to indicate the level of fuel within the tank. The sensor is mounted in such a way that it is serviceable.

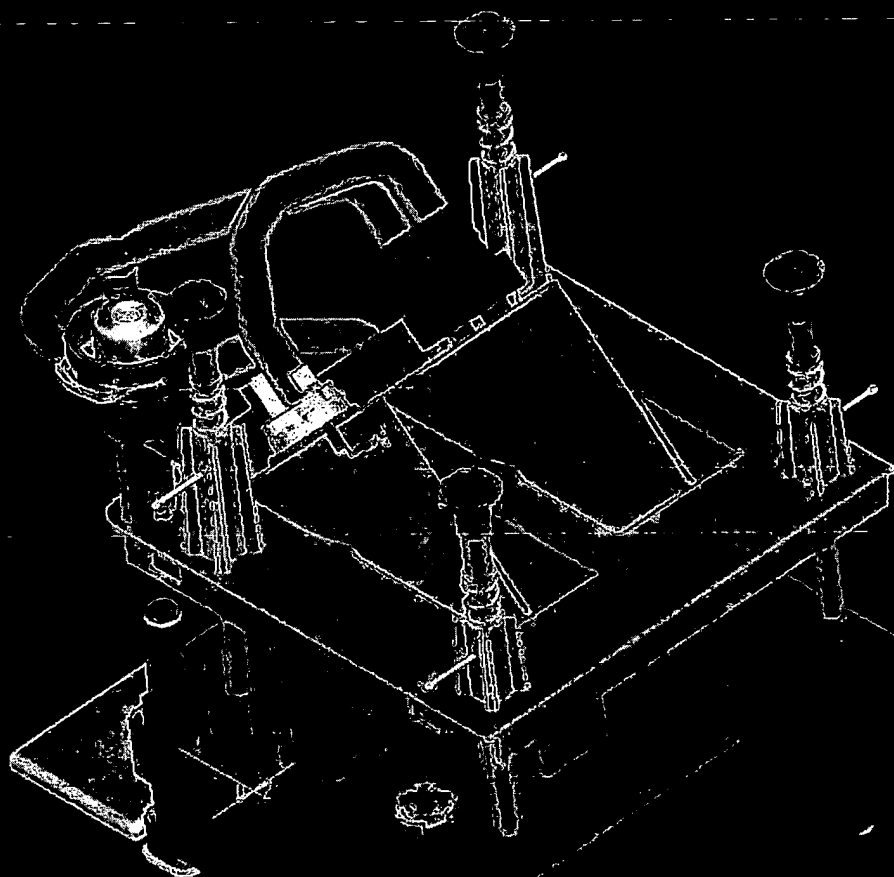
The features to assemble the module to the fuel tank are of a material that will weld to the inside surface of the tank. These can be mounted one of two ways to the reservoir assembly. The first method is to mount them to the lower sides of the reservoir and allow for the module to be adhered to the bottom inside surface of the tank. The second method is to mount the features to support rods that extend upward from the reservoir assembly. The features are welded to the upper inside surface of the tank. These support rods have springs about them that force the welding features away from the reservoir assembly allowing for the reservoir assembly to rest on the bottom of the tank.

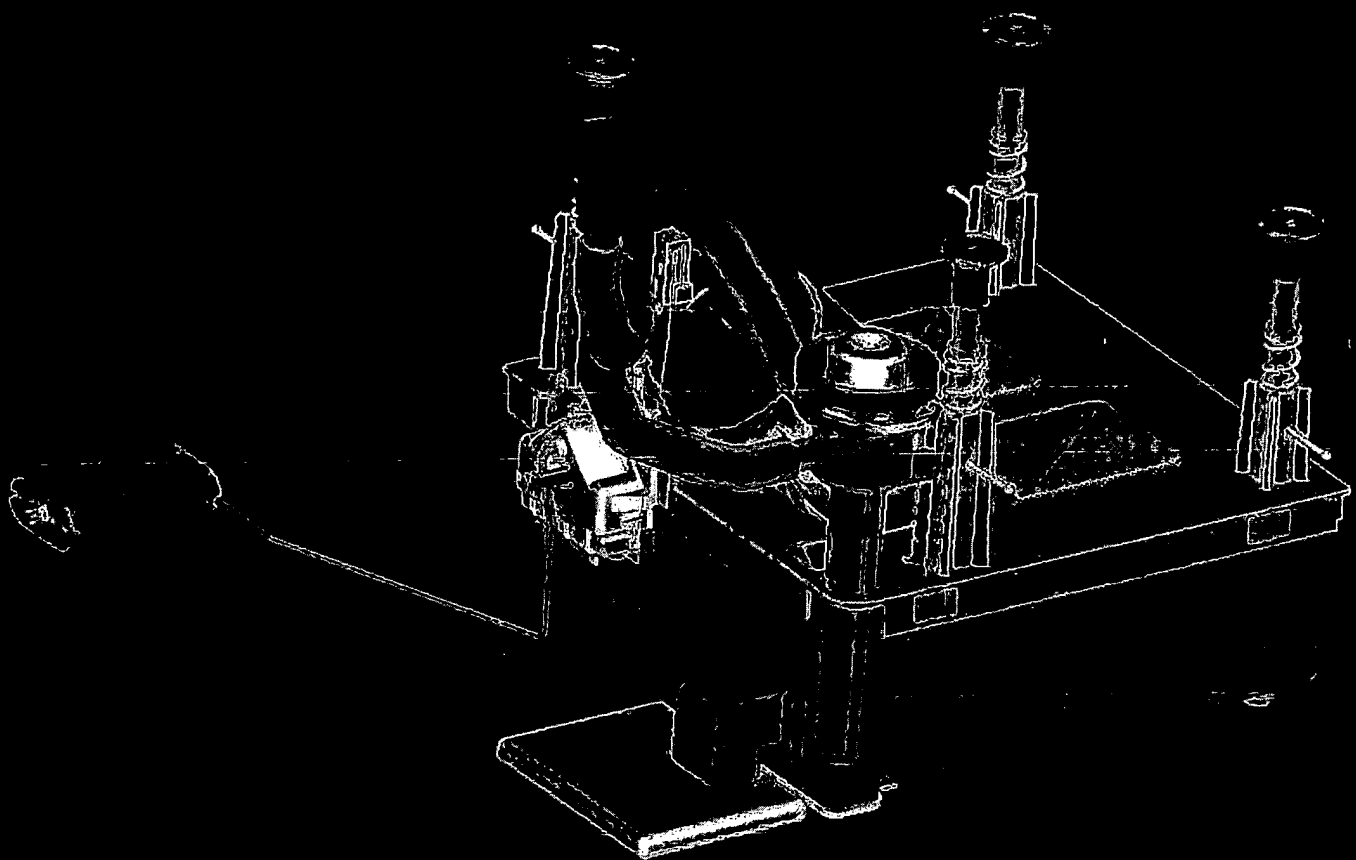
An inline filter, if used, mounts to the cover. The retaining features can be designed such that the filter can be removed for service. The filter body is made of a conductive material so that it is electrically grounded to the rest of the fuel system and subsequently the rest of the vehicle. By electrically grounding the filter, buildup of electrostatic charge is minimized.

The other main component of the module is the flange and hose assembly. The flange and hoses are made of a conductive material to allow for electrically grounding the fuel carrying components of the module. The flange has a welded-on pass through wire harness to provide electrical power to the pump and level sensor. The pass through wire harness has a non-conductive connector to electrically isolate the current carrying wires from each other and from the conductive flange.









GRAP809B

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Blkt:

Buyer: 5161

Order Date:

Promise Div:

REDACTED

Total Price:

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Program:

GM DELTA

Suppl: BEDFORD PLANT

8023A 3120 W 16 TH ST

BEDFORD

IN 47421

Paymt: 15 NET 15TH AND 30TH PROX

Route: 01 SELLER'S DELIVERY

Fob: 02 DESTINATION

Trans: 01 COLLECT

Funds: USD

Tax: 01 DIRECT PAY

Duty: 01

Ship:

Req: STEVEN THIEL

313-755-4490

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VISTEON CORP RAWSONVILLE MCKEAN & TEXTILE RD

YPSILANTI MI 48197

STEVEN THIEL

ERS CODE 1

SEE INSTRUCTIONS BELOW

\*\*\*\*\*  
LINE ---ITEM NUMBER--- QUANTITY- U/M -PRC/QTY- U/M ---UNIT PRICE---  
----- D E S C R I P T I O N -----

001 MISC 111101 60.00000 EA .00000 240.00000  
ASSEMBLY COST FOR PZEV FUEL DELIVERY MODULES

KEYWORD:

COMMODITY CODE:

TOX #:

\*\*TOTAL COST:

14400.00 USD

\*\*TOTAL ITEMS: 1

\*\*\*\*\*  
\*\*\* CLAUSES \*\*\*  
\*\*\*\*\*

CLAUSE CODE ATP

THIS IS YOUR AUTHORIZATION TO PROCEED.

GRAP809B

Order Print (Unofficial Copy)

(REDACTED)

Reason:

DOC#: A BG PO01 030623

Blkt:

Buyer: 5161

Order Date:

Promise Div:

Total Price:

14,400.00000

Program:

GM DELTA

Suppl: BEDFORD PLANT

8023A 3120 W 16 TH ST

BEDFORD

IN 47421

Paymt: 15 NET 15TH AND 30TH PROX

Route: 01 SELLER'S DELIVERY

Fob: 02 DESTINATION

Trans: 01 COLLECT

Tax: 01 DIRECT PAY

Funds: USD

Duty: 01

Ship:

Req: STEVEN THIEL

313-755-4490

\*\*\*\*\*  
\*\*\* NOTES \*\*\*  
\*\*\*\*\*

001

JULIE STOCKEL. I'LL PROVIDE QUOTE TO YOU VIA EMAIL. THANKS.

\*\*\*\*\*  
\*\*\* SUPPLIERS (BID LIST) \*\*\*  
\*\*\*\*\*

8023A: BEDFORD PLANT

3120 W 16 TH ST

BEDFORD

IN 47421